CLAIMS (STATEMENTS OF THE INVENTION):

1. A method for assaying for an immunological response in a mammal comprising: (a) administering to the mammal a chemical probe for reactive oxygen species; (b) obtaining a sample from the mammal; and (c) analyzing the sample for an oxidation product of the chemical probe.
2. The method of statement 1, wherein the chemical probe is an alkene that can be oxidized and that generates a detectable oxidation product.
3. The method of statement 1, wherein the chemical probe is 3-vinyl-benzoic acid, 4-vinyl-benzoic acid, indigo carmine, stilbene, or cholesterol.
4. The method of statement 1, wherein the reactive oxygen species is an antibody-generated oxygen species.
5. The method of statement 1, wherein the reactive oxygen species is a superoxide radical, hydroxyl radical, peroxyl radical or hydrogen peroxide.
6. The method of statement 1, wherein the reactive oxygen species is ozone or any chemical species that possesses the chemical signature of ozone.
7. The method of statement 1, wherein the sample is a bodily fluid.
8. The method of statement 5, wherein the bodily fluid is whole blood, serum, plasma, synovial fluid, lymph, urine, saliva, mucus or tears.
9. The method of statement 1, wherein the sample is a tissue sample.
10. The method of statement 1, wherein the oxidation product of the chemical probe is detected by high pressure liquid chromatography, mass spectrometry, ultraviolet light spectrophotometry, visible light spectrophotometry, liquid chromatography, gas spectrometry, or liquid chromatography linked mass spectrometry.
11. A method for assaying for an inflammatory response in a mammal comprising: (a) administering to the mammal a chemical probe for reactive oxygen species; (b) obtaining a sample from the mammal; and (c) analyzing the sample for an oxidation product of the chemical probe.
12. The method of statement 11, wherein the chemical probe is an alkene that

can be oxidized and that generates a detectable oxidation product.

13. The method of statement 11, wherein the chemical probe is 3-vinyl-benzoic acid, 4-vinyl-benzoic acid, indigo carmine, stilbene, or cholesterol.

14. The method of statement 11, wherein the reactive oxygen species is an antibody-generated oxygen species.

15. The method of statement 11, wherein the reactive oxygen species is a superoxide radical, hydroxyl radical, peroxyl radical or hydrogen peroxide.

16. The method of statement 11, wherein the reactive oxygen species is ozone or a chemical species that possesses the chemical signature of ozone.

17. The method of statement 11, wherein the sample is a bodily fluid.

18. The method of statement 17, wherein the bodily fluid is whole blood, serum, plasma, synovial fluid, lymph, urine, saliva, mucus or tears.

19. The method of statement 11, wherein the sample is a tissue sample.

20. The method of statement 11, wherein the oxidation product of the chemical probe is detected by high pressure liquid chromatography, mass spectrometry, ultraviolet light spectrophotometry, visible light spectrophotometry, liquid chromatography, gas spectrometry, or liquid chromatography linked mass spectrometry.

21. An in vitro assay for neutrophil activity comprising: (a) obtaining a neutrophil sample from a mammal; (b) activating neutrophils in the neutrophil sample; and (c) observing whether a reactive oxygen species can be detected in the neutrophil sample.

22. The method of statement 21, wherein the reactive oxygen species is a neutrophil-generated oxygen species.

23. The method of statement 21, wherein the reactive oxygen species is an antibody-generated oxygen species.

24. The method of statement 21, wherein the reactive oxygen species is a superoxide radical, hydroxyl radical, peroxyl radical or hydrogen

peroxide.

25. The method of statement 21, wherein the reactive oxygen species is ozone or a chemical species that possesses the chemical signature of ozone.

26. The method of statement 21, wherein the reactive oxygen species is detected with a chemical probe.

27. The method of statement 26, wherein the chemical probe is an alkene that can be oxidized and that generates a detectable oxidation product.

28. The method of statement 26, wherein the chemical probe is 3-vinyl-benzoic acid, 4-vinyl-benzoic acid, indigo carmine, stilbene, or cholesterol.

29. The method of statement 27, wherein an oxidation product of the chemical probe is detected in order to determine whether a reactive oxygen species is present in the neutrophil sample.

30. The method of statement 29, wherein the oxidation product is detected by high pressure liquid chromatography, mass spectrometry, ultraviolet light spectrophotometry, visible light spectrophotometry, liquid chromatography, gas spectrometry, or liquid chromatography linked mass spectrometry.

31. A method for identifying an agent that can modulate neutrophil activity comprising: (a) obtaining a neutrophil sample from a mammal; (b) exposing the neutrophil sample to a test agent; (c) activating neutrophils in the neutrophil sample; and (d) quantifying an amount of reactive oxygen species generated by the neutrophil sample.

32. The method of statement 31, wherein the method further comprises quantifying an amount of reactive oxygen species generated by a neutrophil sample that has not been exposed to the test agent but is from the same mammal.

33. The method of statement 31, wherein the neutrophil sample is a bodily fluid.

34. The method of statement 33, wherein the bodily fluid is whole blood,

synovial fluid or lymph.

35. The method of statement 31, wherein the neutrophil sample is a tissue sample.

36. The method of statement 31, wherein the reactive oxygen species is a neutrophil-generated oxygen species.

37. The method of statement 31, wherein the reactive oxygen species is an antibody-generated oxygen species.

38. The method of statement 31, wherein the reactive oxygen species is a superoxide radical, hydroxyl radical, peroxyl radical or hydrogen peroxide.

39. The method of statement 31, wherein the reactive oxygen species is ozone or a chemical species that possesses the chemical signature of ozone.

40. The method of statement 31, wherein the amount of reactive oxygen species is quantified with a chemical probe.

41. The method of statement 40, wherein the chemical probe is an alkene that can be oxidized and that generates a detectable oxidation product.

42. The method of statement 40, wherein the chemical probe is 3-vinyl-benzoic acid, 4-vinyl-benzoic acid, indigo carmine, stilbene, or cholesterol.

43. The method of statement 40, wherein an oxidation product of the chemical probe is quantified.

44. The method of statement 43, wherein the oxidation product is quantified by high pressure liquid chromatography, mass spectrometry, ultraviolet light spectrophotometry, visible light spectrophotometry, liquid chromatography, gas spectrometry, or liquid chromatography linked mass spectrometry.